1. Introduction

Traffic congestion is becoming an increasingly prominent problem in various metropolitan cities, especially in Indonesia. Traffic congestion can occur due to the large volume of vehicles. Especially on Jalan Raya Bojongsoang, which is one of the primary arteries connecting the center of Bandung City with the Bandung Regency area, often becoming the epicenter of congestion which worries local residents(1). Data from 2020 shows 1,251,080 two-wheeled vehicles in Bandung City and 536,973 four-wheeled vehicles. This data increased by 11% per year, dominated by private vehicles at 98%(2). This data results in congestion problems, a significant challenge to residents' mobility and quality of life. Community activities such as entering and leaving projects, shopping centers, housing, and universities increase the congestion level and disrupt the daily activities of residents or students(3).

To illustrate traffic congestion due to various obstacles can be seen in Fig. 1. In Fig. 1, four motorbikes are counted as one vehicle, yellow vehicles are vehicles that hinder the exit or entry of the project, and trucks are large vehicle obstacles. Vehicles are classified into two types: large vehicles and small vehicles. Large vehicles include trucks and buses with a length of more than 5 meters and a width of more than 2.5 meters, while small vehicles include passenger cars and motorcycles with a length of less than 5 meters and a width of less than 2.5 meters.

The multiple linear regression method is used to predict vehicle speed based on density variables (ρ), vehicle crossing obstacles (x_1), and large vehicle obstacles (x_2). The regression model obtained is then extrapolated to produce a speed function. This model allows vehicle speed to be predicted under varying traffic conditions and provides insight into traffic flow dynamics.

This paper focuses on observing the relationship between density and velocity in traffic flow with obstacles that can cause traffic congestion. The velocity function depends on the density of vehicles in Fig. 1. Therefore, the velocity function is approximated by Multiple Linear Regression of the observation data. This is caused by two additional independent variables used in this research, i.e., crossing vehicle obstacles and large vehicle obstacles. In this paper, the Lax-Wendroff method is used to describe the model.

This paper aims to explore and simulate a traffic flow model by approximating the velocity-density function derived from observational data. The paper is organized as follows: Section II presents the numerical model and scheme for traffic flow with obstacles. Section III offers a Result. Finally, Section IV concludes the paper.

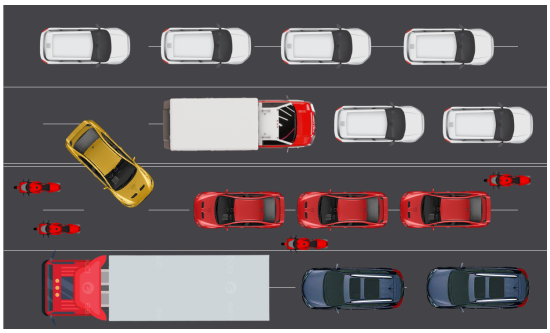

Fig 1. The illustration of obstacle condition at roadside.